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## **The Prototype »Ager«: A Cognitive-Decisional Urbanistic Tool for the Area of Rome Based on Text & Image Integration**

*Alessandro Califano\**

At a conference held in Italy in spring '87 on standardization and new technologies for information retrieval concerning geographic data and management, an author defined towns as complex systems whose evolution cannot be reduced to a linear dynamic. That means that without the help of adequate tools it is impossible to foresee how our decisions and actions may affect them (1).

This analysis can be confirmed by the difficulties the municipal government of Rome is having in tackling with its daily managing and programming problems. The lack of a sufficient knowledge basis is in fact having ever growing negative consequences on the effectiveness of the government's actions, since the burden of its tasks is getting more and more heavy. During the last few years, the Art & Culture Department of the City of Rome - whose activities range from those of a Parks & Recreation Department to those pertaining to the management of a widespread location of museums, libraries and areas of archaeological interest - has more than doubled its staff trying to cope with the growth of user oriented services. The circulation of information, however, still remains more or less as it used to be at the time when the Department limited its activities in peacefully supervising quietly slumbering museums.

Sure enough, some improvements have been attempted in order to augment and rationalize the information needed, both, to document the cultural historical and art heritage of the Roman environment and to effectively plan new services or urban transformations. One of the new tools has been the mapping (1: 10,000) of the whole municipal area (ca. 150,000 hectares) which started in the seventies. Subsequent archival and field research recently allowed to develop a new edition of this cartography, known as »Carta dell 'Agro Romano« that is now in print and should come out by summer this year. But even so, information given by that tool is not at all integrated with that available from other public sources, as, for

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instance, the important collection of air photographs referring to a wide portion of the municipal territory.

In order to bridge that shortcoming, a pilot project has been started in 1986 at the Art & Culture Department of the City of Rome. It was meant to be a mixed-media solution for fundamental cartographic information and was mainly based on the »Carta dell 'Agro«. Its first version, named »AGER«, was ready by summer '86 and has been described at A.I.C.A. 86, the annual conference of the main Italian association for informatics in September of that year (2). At that time, the project consisted in overlapping a standard grid on the »Carta dell 'Agro« map. Each element of this grid was considered to be a single record of our database. In each record, the basic prevalent information - i.e. identification data, topographic information and thematic information (3) - was stored, collecting it, both, from the existing cartography and from other sources. Though the record did not focus on a single »land object«, but rather on what may be called a geographic unit \* which does not allow exact localization of »land objects« and causes a certain degree of vagueness regarding quantitatively secondary information - it was still possible to get a fairly clear representation of the elements characterizing single territorial units. This grid-solution was the same adopted some years before in a study about computerized mapping of agricultural production and soil composition, made by a research group of the municipal government of Rome. Its methodological approach remains valid, though its results should of course be integrated and updated. The Landsat (4), which is now giving very low cost information if compared to air photography, may be a good source to think of. The fields of the record were not limited just to geological or agricultural aspects, but collected also information about roads, orientation of slopes and watercourses and - what was most important for the Department's activity - documentation regarding archaeological areas or monuments and their conservation status. Having extreme, almost crude budget limitations, it was not possible to conceive the option of linking our database to a digitized cartography, in order to properly screen the results of a cross-search through the records. Though something had been done in that direction by the municipal government of Rome for the »downtown« area (5), which covers about 10% of the whole municipal territory, it was not conceivable to do the same in our case. This was the reason why we had to choose the grid-solution, in order to make it easier to switch from the computer-stored information or our database to the traditional cartographic media.

The current version of the prototype AGER, which has been studied so far and has been discussed at the Cologne Computer Conference in September 1988, has adopted more advanced solutions to neutralize previously unsatisfactory features and to enhance its feasibilities. The videodisc

technology of information storage seems to guarantee much better results with a more limited expenditure (6). Still this solution is not to be considered equivalent to a complete digitizing of the cartography, in order to obtain a virtually unlimited amount of thematic maps. But as it is, we have to be realistic about the whole matter, and accept the fact that, next to our budget limitations, there is perhaps too big and too complex an information burden to be able to control all variables and all relevant data-structures: at least in the humanities, we are not even able to detect all the variables influencing the phenomena that interest us (7). But on the other hand, the videodisc approach seems to be a sufficiently sound-working solution, though it remains tied to the already discussed grid system and to its not completely satisfactory philosophy of relative predominance of variables in the single geographic units. The videodisc allows us, however, to broaden our knowledge basis with an extremely complex and versatile multimedial tool and to lessen the decisionmaking burden.

In consideration of the unsteadiness of cause-effect relations between presence/absence of a certain element or variable and probability or relevance of a certain phenomenon, we chose for our DB-project a large-grid structure as being the one allowing us a wider range of interpretations. Though less exact in the details, such a wider and more flexible grid has the advantage of not being tied to a fixed set of conditions, while a finer grid, though more detailed in its results, is also more limited in its applications. We were moreover aware of the impossibility to guarantee well-balanced, exhaustive, reliable and homogeneous information throughout our records. Having to choose between a greater predictive strength on a limited field, and a lesser one, with, however, a much wider range of pertinence, we went for the lesser evil, confiding that predictions may anyway be improved step by step, by repeating and more and more refining the browsing through available information. The single record of the DB still refers to the single element of the territorial grid. The record's format is not too strictly structured and the data-fields only regard essentials (like identification keys and a series of codified variables) while a fairly large share of space is left over for free-text information and controlled terms, acting as memos referring to elsewhere stored documentation. In this way, the information in the records of the database is linked to related information which is either to be accessed through the videodisc system, or otherwise stored in different archives, some of them not even belonging to our Department.

Access to the supplementary documentation hinted at in the single records of the database, but stored in other archives, is made easier by a tree-structured file series. The records of secondary files (i.e. the files not having as basic record the single geographic unit of the grid) may give further details concerning particular archives and their access means or

the identification data of documentation regarding single records in the main database. Though access to other archives may sometimes be difficult or time-consuming, we mostly avoided reproducing somebody else's documents to make research easier. In fact, this could eventually only lead to a pretty useless mammoth archive, with great management difficulties and costs, whose centralization would have no control at all over modifications occurring in the prephenic archives and may give no guarantee concerning updatedness of its information.

As in previous versions of the AGER prototype, the aim in planning a mixed-media database with the help of the videodisc technology lies mainly in what may be called »maps of risk« (8). That means the chance and likeliness to find given phenomena retracing through the grid some variables which had been previously found to be connected to similar events, attested in other geographical locations. We may, for instance, be looking for a certain kind of preroman settlement and may have a limited budget for field research and prospect. Browsing through the available information concerning similar sites which have already been traced, it would, thus, be possible to find locations where similar conditions and variables may give us hope to find another such site. Moreover, it could be possible to combine this search with the rates of expenditure for prospecting in different geological settings and to instruct the system to consider also a given soil type and to exclude another one, thus making results even more accurate and responding to the given task.

Something similar could of course be done for a whole range of different needs. Laying out the best plan for a new road in a seismic area, or finding the more economic solution for connecting isolated buildings to an existing telephone-net, or efficiently controlling private activities in areas of archaeological interest, all these are tasks that may be more readily and easily tackled using existing information in a more integrated way. The expense of implementing a videodisc system based on the AGER-prototype may, thus, repay itself in a short time by means of a higher efficiency of management and of a higher quality of service offered to the public (9).

### Notes

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- (1) Bertuglia 1987, Vol. 1, p. 44
- (2) Califano - Portoghese 1986, pp. 611-618
- (3) Bogaerts 1987, vol. I, pp. 27-41, with scheme at p. 35
- (4) Pegoraro 1987, vol. II, pp. 709-738
- (5) Comune di Roma - USICS 1986

- (6) Alsford - Granger 1987, pp. 187-200 for a costs/benefits evaluation
- (7) Califano 1987, pp. 457-465
- (8) Califano - Portoghese 1986, p. 612
- (9) Califano - Portoghese 1988

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